

IV. Electromagnetic Compatibility Evaluation Conclusions



Electromagnetic Compatibility Evaluation

Conclusions

From the tests performed in the anechoic chamber, it can be concluded that the common building materials tested exhibited a varying range of attenuation of the EUT's re-radiating GPS signal. The composition of the structure in which the EUT is intended to be located is one of the factors that will determine the distance and effective radiated power of the GPS re-radiated signal. Consideration of the building material should be taken when installing a GPS re-radiator kit.

Further, from the tests performed in the loading bay at MET Labs, it can be concluded that, under these conditions, an errant signal can be detected outside of the MET Labs building (test site) at a distance of 27.88 meters from the re-radiating antenna (13.12 meters away from the building). From this observation, and tests performed on common building materials, a person installing a GPS re-radiator into a site should be able to extrapolate a "safe zone" where other GPS receivers should be able to function without interference. It should also be noted that all measurements and observations were made using a GPS re-radiator kit described in the beginning of this report. Care should be taken using any other variation of the GPS re-radiator kit. After installation, measurements should be taken to ensure the "safe zone" of operation. A GPS receiver of the variety common to that particular installation should be used.

V. Test Equipment



Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

		Test Date(s)	:May 14, 2003		
MET Asset #	Nomenclature	Manufacturer	Model	Last Cal Date	Cal Due Date
1T40 8 0	High Frequency Spectrum Analyzer	Hewlett Packard	8563A	09/22/2002	09/22/2003
1T2665	Horn Antenna	ЕМСО	3115	03/07/2003	03/07/2004
1T 4148	Semi-Anechoic Chamber	Rantec	20	05/30/2002	05/30/2003

End of Report

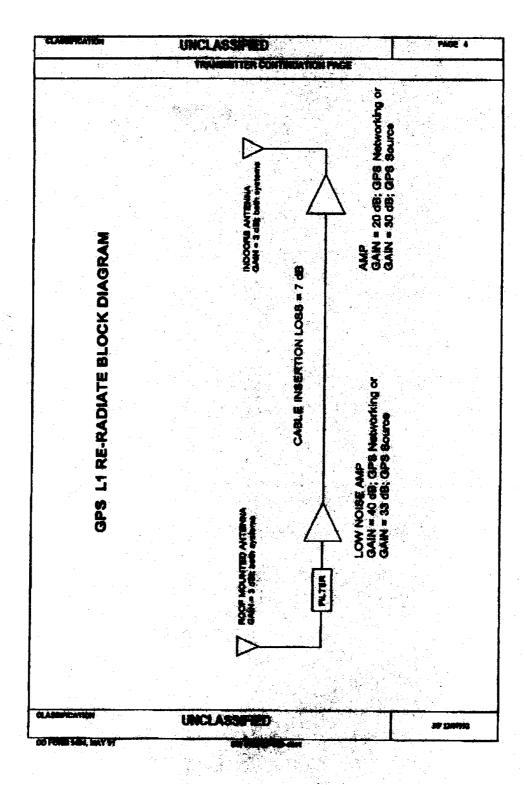
Exhibit C

US Army DD 1494 filed with NTIA for clearance for re-radiation kits

APPLICATION FOR SPECTRUM REVIEW	UNCLASSIFIE	31 Jul 2002		E 1 OF 9
	HTIA GEN	ERAL INFORMATION		
1. APPLICATION TITLE (U) GPS No	structing L1 Re-Redicting Kil			
2. SYSTEM HOMENCLATURE (U) G	PS L1 Band Re-Radiolog XA			
3. STAGE OF ALLOCATION (L)	a STAGE 1	b. STAGE 2 EXPERIMENTAL	e. STAGE 3 DEVELOPMENTAL	X 4. STABE 4 CARRACTICIONAL
4. PREQUENCY REQUIREMENTS				
a Principic (U)	1585 Hz - 1686 Hz			
b. EMISSION DESIGNATORS (U)	2445610			
E. POSPOSE OF SYSTEM, OPENATION			(MARTINE USE)	# A F X F 70
(U) The system is used to re-radials exhibits the operation of GPS re-			لببا	
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E HIPORMATION TRANSPER REQUEST	MENTELS NA		 	
7. ESTIMATED BETIAL COST OF THE S	787616(3) 5300 each will			· · · · · · · · · · · · · · · · · · ·
s. TARGET DATE FOR			•	
a APPLICATION APPROVAL (U) 10-31-2002	•	TEM ACTIVATION 13-15-2002	c. \$78764 (J) N	TERMINATION A
S. SYSTEM RISLATIONSHIP (U) N AND RESERVITALITY	<u> </u>			
10. REPLACEMENT RECORDATION (L)) NA			
TI. NELATED ANALYSIS ANDIOR THET	DATA (L) ATAD			
12. HUMBER OF BIOBILE UNITS (L)	NA .			
II. OF DERIVER ALL AND A FOR				
A.STABLE (J) NA			<u> </u>	
Patrata (1) W			· · · · · · · · · · · · · · · · · · ·	
e William (U) USEP				
14. TYPE OF SERVICES FOR STREET			MS (C.) See Projects) 1	* :
(U) Fined		17. STATION CLAS	SIEM FOR STAGE 4	
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	t: These systems are onl him the confines of a be		nomination of	
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COMMERCALING INSTRUCTIONS		<u> </u>		JF 1247002
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UNCLASSIFIED	PAGE 2
TRANSMITTER EQUI	PMENT CHARACTERISTICS
1. NOMENCLATURE, MANUFACTURER'S MODEL NO. (U) NLAZORPIC-NISI/110 (See Remarks)	2. MANUFACTURER'S NAME (U) GPS NETWORKING, INC.
3. TRANSMITTER INSTALLATION (U) STATIONARY, CEILING MOUNT, INDOOR	4. TRANSMITTER TYPE (I) LINEAR REPEATER
6. TUNING RANGE	(U) LINEAR, REPEATER 6. METROD OF TUNING
(U) 1565 MHz - 1586 MHz	(U) NA
	(U) 24M0G1D (U) (U)
7. RF CHANNELING CAPABILITY (U) NA	12. EMISSION BANDWIDTH
9. FREQUENCY TOLERANCE (U) NA	CALCULATED X MEASURED
10. FILTER EMPLOYED	a3 dB (U) 15 MHz (U) (U)
(U) a. YES X b. NO	b20 dB (U) 25 MHz (U) (U) (U) c40 dB (U) 50 MHz (U) (U) (U)
11. SPREAD SPECTRUM	(4)
(U) X 2. YES D. NO	d50 dB (U) 65 MHz (U) (U) e. OC-BW(U) 41 MHz (U) (U)
13. MAXIMUM BIT RAYE	15. MAXIMUM MODULATION FREQUENCY
(U) 10.23 Mbps	(U) NA
14 MODULATION TECHNIQUES AND CODING (U) DSSS; QPSK with 10.23 MHz PRN code	17. DEVIATION RATIO (U) NA
	18. PULSE CHARACTERISTICS
16 PRE-EMPHASIS (U) a. YES X b. NO	a. RATE (U) NA (U) (U)
19 POWER	b. WIDTH (U) NA (U) (U)
a. MEAN (U) See Remarks (U) (U)	c. RISE TIME (U) NA (U) (U)
b. PEP (U) NA (U) (U)	d FALL TIME (U) NA (U) (U)
20. DUTPUT DEVICE	e. COMP RATIO (U) NA (U) (U) 21. HARMONIC LEVEL
(U) TRANSISTOR DEVICE	a. 2nd (U) -80 d8
22. SPURIOUS LEVEL (U) -80 dB	b. 3rd (U) -80 dB
(U) NA	c. OTHER (U) -80 dB
24. REMARKS (U) Item 1 and 2: There are two vendors wit implementation approach. The informatic GPS Networking, Inc. The second vendor part All. Item 4: The transmitter section, for the implemented as a 20dB amplifier that it signal that is received from outdoors in additional modulation imparted on the section for the GPS Source system is in Item 19: The GPS signal reaches the ear entire GPS Networking system (the receiped B), interconnecting cable losses (7 dB will impart a maximum of 56 dB of gain.	on stated on the form are for the is GPS Sounce with transmitter the GPS Hetworking system, is controlled to the contro
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		40), interconnectiff 400, Figure 17 40), and translative and 130	(a)	
		will import a notificate the off getter Print, the transmit power	is	
1		black diagram of the system.		
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				VER EQUIPM	INT CHARACTERISTICS	
(U) GSP-S82	RE, MANUFACTUR (See Remarks)	ERS MOD	EL NO.		2. MANUFACTURER'S NAME (U) Allis Communications	
J. RECEIVER INST	ALCATION JOIL-Building Roof-O				A RECEIVER TYPE	
5. TUNING RANGE		alouors			(U) Amplify (See Remarks) 6. METHOD OF TUNING	
į	MHz - 1585.42 MHz	z			(U) NA	
i					8 EMISSION DESIGNATORS	
7. RF CHANNELIN	G CAPABILITY				(U) 24M0G1D	
(U) NA						
9. FREQUENCY TO (U) NA	DILERANCE					ASURE
10. IF SELECTIVITY	f 1st (U)	2nc	<i>(</i> U)	3rd (U)	a3 dB (U) 40 MHz	
a3 dB	NA NA	NA .	- (0)	NA (U)	b: -20 d8 (U) 90 MHz	
					c. 48 dB (U) 250 MHz	
h. 20 dB	NA	NA.		NA	d. Preselection Type (U) 4 Pole Dielect	nic
c -60 dB	NA	NA		NA	13. MAXIMUM POST DETECTION FREQUENCY	
12. IF FREQUENCY					(U) NA	
a. 1st (U)	NA				14. MINIMUM POST DETECTION FREQUENCY (U) NA	
b. 2nd (U)	NA				(U) NA 18. MAXIMUM BIT RATE	
c.3rdf (U)	NA				(U) NA	
15. OSCILLATOR TI	UNED	1st (U)	2nd (U)	3rd (U)	17. SENSITIVITY	
			+	+		
a. ABOVE 7UN	ED FREQUENCY		İ		a. SENSITIVITY (U) 101 dBm	
b. BELOW TUN	ED FREQUENCY	 	1	1	b, CRITERIA (U) 0 dB	
	WE OR BELOW			 	c. NOISE FIG (U) 1.6 dB	
18. DE-EMPRASIS		 -	1			
(U)	a. YES	×	b. NO		d. NOISE TEMP (U)	
9. MAGE REJECT	ON				20. SPURIOUS REJECTION	
(U) NA					(U) NA	
21. RFMARKS (U)	system. The manufactured	receiver by Ace 1	for the Technolo	GPS Source s gy.	form is for the GPS Networking stem is the GA 1575N	
	Item 4: The	receiver	for the	GPS Networki	g system is implemented with a	
	dielectzin f	the high ilter sev	niy sele rvina 2=	Ctive dielect	ric patch antenna and a No frequency conversion is	
	performed no:	r is the	re any k	ind of detect	on performed. The intent is	
	for the rece:	iving ant	tenna and	d LNA to coll	ect the GPS signal outdoors in	
	by the crans	uitter se	ction.	The receiver	casting of the signal indoors or the GPS Source system is	
	implemented t	eath a 33	de LNA	, a the highl	selective dielectric patch	
	actenna and a	a dretect	ric file	cer serving a	preselection.	
	ltem 17: Sens	sitivity	is calc	ulated using	.0 dBm Minamum Detectable	
	Signal, a Non	ise Figut	e of 1.0	6 dB, and RF	d8 bandwidth of 40 Mxz.	

UNCLASSIFIED	PAGE 6
ANTENNA E	QUIPMENT CHARACTERISTICS
(U) a. TRANSMITTING X	b. RECEIVING c. TRANSMITTING AND RECEIVING
NOMENCLATURE, MANUFACTURER'S MODEL NO.	J. MANUFACTURER'S NAME
(U) GPS S82 (See Remarks)	(U) Affic Communications
FREQUENCY RANGE	5. TYPE (U) Dielectric Patch
(U) 1565 MHz ~ 1585 MHz	7. SCAN CHARACTERISTICS
	a. TYPE (U) NA
POLARIZATION	b VERTICAL SCAN (U) NA
(U) Right-Hand Circular	(1) Max Elev (U) NA
. GAIN	(2) Min Elev (U) NA
a. MAIN BEAM (U) 3 dBi	(3) Scan Rate (U) NA
b. 1st MAJOR SIDE LOBE	E. HORIZONTAL SCAN (U) NA
(U) NA	(1) Sector Scenned (U) NA
. BEAMWIOTH	107
a. HORIZONTAL	(2) Scan Rate (U) NA
(U) 360 deg	d. SECTOR BLANKING (U)
b. VERTICAL (U) 180 deg	d. SECTOR BLANKING (U) (1) YES X (2) NO

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1. (J) X a TRANSMITTED	5	A. Halla	reas /	1	APPENDITURE AND	Name and Address of the Land
2. HOMENCE ATTIME, INVISTRACTUM (J.) GPS-P2 (See Permatu)	FT 800EL NO.		1 MANUTACTURE (A) Aris Com	TO TAKE		
			S. THE AND D	Laborato Post		
4. PRECEDENCY RANGE 4.0 1005 MHz - 1005 MHz			7. SCAN CHARACT			
(U) 1080 MT - 1080 MTE	+		a THE RUY N		:	
S. POLARIZATION			L. VINNEAL SE	W (L)	NA.	·····
(U) Physic Hand Circular			(1) Nov. 20-		MA	
E CAM			(O) Min May	N	NA	
a. MAIN BEAM			(A) Same Parks	(1)	NA .	
(A) 3 dip	· · · · · · · · · · · · · · · · · · ·		e. HORECHICAL	MEAN (U)	MA	
(0)		ŀ				
S. DEALINEPIN			(I) Peter See	(J)	•	
a. Incollection (Ad.				£4	NA .	
(V) 300 dag		<u>†</u>	4 SECTOR BLAS			
L. VERTICAL				(6)	(1) 180	X (2) MO
(L) 180 deg						
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DD FORM 1484, MAY 91

(J) a. TRAMMINISTEM X a. RECE RESERVE AND B. HARMET ACTUMENTS MICHEL NO. (J) GPS Antenna PRECEDENCY SAME (A) 1000 MAIX - 1005 MAIX POLABEZATION (U) 3-00 a. MAIN REAM (U) 3-00 b. Not MAIAN (MINE LONE (J) MA REAMONDONTAL (J) 300 day b. VERTIESAL (L) 100 day	1. BANKSPACTIONALTS HANDE (A) AND TECHNOLOGY E. TYPE (L) 7. SCAN CRAMACTIONISTICS 2. TYPE (L) HA 5. VERTICAL SCAN (L) HA (S) STAN STAN (L) HA (S) SCAN STAN (L) HA (H) SWAN SCAN (L) HA (H) SWAN SCAN (L) HA (2) SCAN STAN (L) HA (4) SWAN SCAN (L) HA (4) SWAN SCAN (L) HA (5) SCAN STAN (L) HA (4) SWAN SCAN (L) HA (5) SCAN STAN (L) HA (6) SWAN SCAN (L) HA (7) SCAN STAN (L) HA (8) SCAN STAN (L) HA (9) SCAN STAN (L) HA (1) SWAN SCAN (L) HA (2) SCAN STAN (L) HA (3) SCAN STAN (L) HA (4) SWAN SCAN (L) HA (5) SCAN STAN (L) HA (6) SCAN STAN (L) HA (7) SCAN (L) HA (8) SCAN STAN (L) HA (9) SCAN STAN (L) HA (9) SCAN SCAN (L) HA (1) SCAN (L) HA (2) SCAN STAN (L) HA (3) SCAN (L) HA (4) SCAN (L) HA (5) SCAN (L) HA (6) SCAN (L) HA (7) SCAN (L) HA (8) SCAN (L) HA (9) SCAN (L) HA (9) SCAN (L) HA (9) SCAN (L) HA (10) SCAN (L) HA (11) SCAN (L) HA (12) SCAN (L) HA (13) SCAN (L) HA (14) SCAN (L) HA (15) SCAN (L) HA (16) SCAN (L) HA (17) SCAN (L) HA (18) SCAN (L) HA (19) SCAN (L) HA
HOMENCLATION, HANDERACTORIES MODE, NO. (L) GPS Antenna (L) 1000 MHz - 1000 MHz POLARIZATION (U) GAM! B. NOT READ (U) 1 dB L. NOT READ (U) 1 dB READ RE	1. BANKSPACTIONALTS HANDE (A) AND TECHNOLOGY E. TYPE (L) 7. SCAN CRAMACTIONISTICS 2. TYPE (L) HA 5. VERTICAL SCAN (L) HA (S) STAN STAN (L) HA (S) SCAN STAN (L) HA (H) SWAN SCAN (L) HA (H) SWAN SCAN (L) HA (2) SCAN STAN (L) HA (4) SWAN SCAN (L) HA (4) SWAN SCAN (L) HA (5) SCAN STAN (L) HA (4) SWAN SCAN (L) HA (5) SCAN STAN (L) HA (6) SWAN SCAN (L) HA (7) SCAN STAN (L) HA (8) SCAN STAN (L) HA (9) SCAN STAN (L) HA (1) SWAN SCAN (L) HA (2) SCAN STAN (L) HA (3) SCAN STAN (L) HA (4) SWAN SCAN (L) HA (5) SCAN STAN (L) HA (6) SCAN STAN (L) HA (7) SCAN (L) HA (8) SCAN STAN (L) HA (9) SCAN STAN (L) HA (9) SCAN SCAN (L) HA (1) SCAN (L) HA (2) SCAN STAN (L) HA (3) SCAN (L) HA (4) SCAN (L) HA (5) SCAN (L) HA (6) SCAN (L) HA (7) SCAN (L) HA (8) SCAN (L) HA (9) SCAN (L) HA (9) SCAN (L) HA (9) SCAN (L) HA (10) SCAN (L) HA (11) SCAN (L) HA (12) SCAN (L) HA (13) SCAN (L) HA (14) SCAN (L) HA (15) SCAN (L) HA (16) SCAN (L) HA (17) SCAN (L) HA (18) SCAN (L) HA (19) SCAN (L) HA
(L) GPS Antenna (U) 1005 MHz - 1005 MHz POLARIZATION (U) GAM BEANN BEAN (U) 3-05 L ON BEANN (U) 3-05 BEANN (U) 3-05 L ON BEANN (U) 3-05 BEANN (U)	(A) Ass Technology E. TIPE (L) 7. SCAN CEMBACTERISTICS 6. TIPE (L) NA 5. VERTICAL SCAN (L) NA (9 State Star (L) NA (4 SECTOR SLAMMENS (L) NA 4. SECTOR SLAMMENS (L) (1) YES X (5) NO
POLABRIATION (U) BANK	7. SCAN CHARACTERSPICES A. TYPE (A) HA L. VERRELL SCAN (A) HA (S) Since Since (A) HA (S) Since Since (A) HA (A) SCAN SCAN (A) HA (I) Scan Since (A) HA
(L) 1000 MHz - 1000 MHz POLARIZATION (L) GARN a MAR MEAN (U) 3 dB b Set MAJOR SME LOBE (L) MA a MORRESOTTAL (L) 300 dby b VERTICAL (L) 100 dbg a REMARKS (L) It was 1: This assessma is used by the CRE	S. TYPE (S) NA. 5. VESTICAL SCAM (S) NA. (19 Single Single (L) NA. (2) Single Single (L) NA. (3) Single Single (L) NA. (4) Single Single (L) NA.
(U) GAMP a MARI READ (U) 3 d01 b. for MALCR SERF LOBE (U) 10 BECANNINGTH a. HOMEONIAL (U) 300 dop b. VERTICAL (U) 100 dop b. REMARKS (U) I tou 1: This assumes is used by the CRE	5. VERTICAL SCAM (A) INA (19 Since Since (A) INA (20 Since Since (A) INA (5) Since Since (A) INA (6) Since Since (A) INA (6) Since Since (A) INA (7) Since Since (A) INA (8) Since Since (A) INA (9) Since Since (A) INA (10) YESS (X) (40 INO
CAMP B. SMAN MEANN (U) 3 dill B. See MALIOR SING LOBE (U) NA BENEROWNTH B. HOMEDINTAL (U) 360 day B. VERTENL (E) 100 day B. REMANDICS (U) Itua 1: This assumes is used by the CRE	(1) State State (J.) MA (2) State State (J.) MA (3) State State (J.) MA (4) State State (J.) MA (4) State State (J.) MA (2) State State (J.) MA (4) State State (J.) MA (5) State State (J.) MA (6) State State (J.) MA
a. MANI REAN (U) 3 dB) b. for MAJOR SEET LOBE (U) 10A REMAIND(T)) a. HONESHTAL (U) 380 dby b. VERTECAL LET This ascesse is used by the CRE	(S) Since State (L) NA (S) Since State (L) NA (NONEONTAL SCAN (L) NA (N) Since State (L) NA (2) Since State (L) NA (3) Since State (L) NA (4) Since State (L) NA (5) Since State (L) NA (6) Since State (L) NA (7) YES X (5) NO
(U) 3-dM b. int MAJOR (MSE LOBE (U) MA RELADINGTH B. HORRESHTAL (U) 380 day b. VETTECH (U) 180 day b. REMANUS (U) Itua 1: This assume is used by the GRE	(\$) Scott Paids (L) NA 4. HOMEONYM, SCAN (L) NA (4) Scott Scott SLANGENS (L) NA (2) Scott State (L) NA 4. SECTOR SLANGENS (L) (5) YES X (5) NO
b. for MAJOR (ME) LOBE (U) MA REASONDOTO a. HORSESHTAL. (U) 350 day b. VERTICAL. (L) 150 day L. REMANUS (U) Itua 1: This assume is used by the GRE	(4) Sector Section (L) IA. (2) Sector SLAMENS (L) IA. (1) YES X (5) HO
(J) MA BEAGNINGTH A. HONDESHTAL (J) 350 deg 5. VERTECAL (L) 150 deg I. REMANDES (J) Itua 1: This assume is used by the GRE	(4) Sector Section (L) IA. (2) Sector SLAMENS (L) IA. (1) YES X (5) HO
a. NONESHITAL. (J.) 300 deg j. VERTECHL. (J.) 100 deg h. REMARKES (J.) Itum 1: This assessma is used by the CRE	(2) Seem Rate (L) NA. d. SECTOR SLAMMING (L) (1) YES X (5) HO
(L) 380 day b. VERTECH. (L) 180 day b. REMONDERS (L) Itua 1: This assume is used by the Cht	d. Sector SLAHOMS (L) (1) YES X (5) HO
(U) 190 dag A REMANDER (U) Item 1: This assessma is used by the CRE	
A REMARKS (J) Itum 1: This assume is used by the GRE	Sourch System for outdoors
Itum 1: This asterna is used by the GPE	Bourch System for outdoors
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MINORIAL PROPERTY

